# TAGGING APPARATUS AND METHOD

INVENTOR:

G. RENE ZAMORA

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Reg. No. 29,858, J. Nevin Shaffer, Jr.

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## CROSS REFERENCE TO RELATED APPLICATION

The applicant hereby claims the benefit of the earlier filing date of March 13, 2003, of Provisional Application Serial No. 60/ 454,420 under 35 U.S.C.§ 119 (e).

## TECHNICAL FIELD

This invention relates to a tagging apparatus and method. In particular, with regard to applying tags to trees, this invention relates to a tagging apparatus and method for affixing a tag to a tree.

## BACKGROUND OF THE INVENTION

Many tasks undertaken by humans involve repetitive motion. The industrial revolution is a byproduct of organizing and simplifying a process by breaking it down to a series of repetitive actions. In every situation where an individual is faced with repeating a task, inevitably the question arises: Can the job be done more efficiently?

For the purposes of example only, and not by way of any limitation, tagging trees is one activity of land surveying in which several hundred trees and sometimes thousands must be tagged as fast as possible. Typically, the best efforts result in tags being applied at a rate of approximately three hundred per day during the course of a surveying project. The conventional technique for tagging trees is to use a hammer, a sack of nails, and a set of tags. The chief

complaint of the manual technique is that it is slow and cumbersome, particularly in less than perfect field environments. This prior art process is cumbersome in that it requires manual handling of a tag, then the nail, then aligning the nail and tag on the tree and then hammering the nail multiple times until the tag is fixed to the tree. Thus there is a need in the art for an apparatus and method for applying tags that is easy to handle, quick, accurate, automatic and inexpensive.

## SUMMARY OF THE INVENTION

The tagging apparatus and method of the present invention includes an automated nail gun. The automated nail gun includes an attached tag magazine. A tag positioning device is connected to the nail gun and a nail gun safety probe. The connection converts the translational movement of the safety probe as it is pressed against a tree, for example only, into rotational movement of the tag positioning device such that a tag is rotated from the tag magazine into position between the nail gun and a tree. Operation of the nail gun results in a nail passing through the tag and into the tree. Removal of the nail gun from the area of the tree completes the removal of the tag from the tag magazine. Additionally, removal of the nail gun from the tree releases the safety probe to return to its extended position and rearms the tag positioning device such that the tagging apparatus is ready for reuse and application of another tag to another tree.

According to another embodiment of the invention, a scanner device is connected to the nail gun. Scanable data is added to the tags. A data reader is connected to the safety probe and connected to the scanner device. In operation, after the tag is attached to a tree, for example only, as described above, the data reader is passed over the scanable data on the tag and transmitted to the scanner device. The scanner device is removably attached to the nail gun such

that, as needed, the scanner device can be removed and the collected data transferred to a data storage and manipulation device, such as a computer.

## BRIEF DESCRIPTION OF THE DRAWINGS

Other objects, features and advantages of the present invention will become more fully apparent from the following detailed description of the preferred embodiment, the appended claims and the accompanying drawings in which:

FIGURE 1 is a partial perspective view of the tag apparatus according to an embodiment of the invention;

FIGURE 2 is a right side perspective view of the tag apparatus shown in Figure 1;

FIGURE 3 is a bottom view of the apparatus of Figure 1;

FIGURE 4 is a left side perspective view of the apparatus of Figure 1;

FIGURE 5 is a bottom partial exploded view of the apparatus of Figure 1;

FIGURE 6 is a top partial exploded view of the apparatus of Figure 1;

FIGURE 7 is a bottom schematic view illustrating the tag rotation function of the tag positioning device of the apparatus of Figure 1;

FIGURE 8 is a bottom view of the apparatus of Figure 1 showing tags being loaded into the tag magazine;

FIGURE 9 shows the apparatus of Figure 1 in the initial position just as contact is made with an object, such as a tree;

FIGURE 10 shows the apparatus of Figure 1 in the final position with the safety probe fully compressed and the tag in position for attachment;

FIGURE 11 shows the apparatus in the final position with a nail piercing the tag and attachment to an object;

FIGURE 12 shows the apparatus removed from the area of the object, the nail attached to the object and piercing the tag with the tag still partially held in the tag magazine;

FIGURE 13 is a bottom perspective view of the apparatus in position close to an object prior to the depression of the safety probe;

FIGURE 14 is another bottom perspective view showing how tags are stored in a ready position;

FIGURE 15 is a bottom perspective view illustrating the conversion of the motion of depressing the safety probe into the rotational motion of the tag positioning device for rotating the tag into position to receive a nail;

FIGURE 16 is a bottom perspective view of the apparatus in the final position with the nail piercing the tag and the tag partially held within the tag magazine;

FIGURE 17 is another bottom perspective view of the tag as it is held in place by the magazine toward the rear of the apparatus as the nail pierces the tag and fixes the tag to the object;

FIGURE 18 is a rear bottom perspective view of the apparatus in the final position with the tag in place just before the nail pierces it;

FIGURE 19 is a bottom view of the tag magazine illustrating three tag constraints, two advance stopped pins and one reset stop pin:

FIGURE 20 is a top perspective view according to another embodiment of the invention wherein a scanner device is attached; and

FIGURE 21 is a side perspective view of the apparatus according to Figure 20.

## DETAILED DESCRIPTION OF THE INVENTION

An embodiment of the present invention is illustrated by reference to Figures 1-21 wherein the same number is used to identify the same element of the invention in each figure in which the element appears. Referring to Figures 1-4, tag apparatus 10 includes nail gun 12. Tag positioning device 14 is attached to nail gun 12. Tag positioning device 14 is attached to safety probe 18 by means of connection 16. Tag magazine 20 is connected to tag positioning device 14. For the purposes of this invention, nail gun 12 may be any nail gun now known or hereafter developed. By way of example only, and not by limitation, nail gun 12, may be a nail gun such is that marketed by Illinois Tool Works Company under the brand *Paslode*. This nail gun is a sixteen gauge angled nail finisher weighing only 4.9 pounds.

Referring now to Figure 5, particulars of tag apparatus 10 are illustrated in this exploded view. Tag positioning device 14 includes keeper 22, keeper shaft 24 and keeper bearing 26. Additionally, tag positioning device 14 includes lower arm 28, large gear 30, large shaft 32, and front bearing 34.

Also shown are tag magazine 20 with tags 36. Tag 36 may be any type of tag now known or hereafter developed. According to one embodiment, tag 36 is a thin, in the range of approximately two hundredths of an inch thick, flexible, polymer tag. Tag 36 may be any dimension useful for a particular purpose. According to one embodiment of the invention, however, it is useful that tag 36 is flexible as this allows the tag to be partially held within magazine 20 while a nail is driven through the tag. Thereafter, as the nail gun 12 is removed from the area of attachment, the tag 36 can bend as it is completely removed from tag magazine 20.

Figure 5 also illustrates safety probe 18 including piston 38, probe extension 40 and probe attachment pin 42. Further, connection 16 includes small bearing 44, small shaft 46, small arm 48, and small gear 50. In combination, depressing safety probe 18 causes small gear 50 to rotate causing large gear 30 to rotate causing lower arm 28 to rotate and push a portion of tag 36 into position underneath safety probe 18 as will be disclosed and discussed more fully hereafter.

Figure 5 also shows attachment plate 52 to which tag magazine 20 is connected. Attachment plate 52 is attached to nail gun 12 as illustrated. It should be noted, that tag magazine 20 includes a spring and a tag follower (not illustrated).

Figure 6 is a top exploded view showing the parts just described with reference to Figure 5.

Figure 7 is a bottom schematic view illustrating the function of the lower arm 28 as it is rotationally moved by the depression of safety probe 18 so as to rotate tag 36 from its location in magazine 20 into position to receive a nail from nail gun 12. Figure 8 illustrates a user loading additional tags 36 into magazine 20. As illustrated, keeper 22 is moved out of the way while tags 36 are loaded. Again, as is known in the art, magazine 20 includes a magazine spring and a magazine follower, not shown. In combination, the spring urges the follower away from the spring thereby putting loading pressure on tags 36 stored in tag magazine 20.

Referring now to Figures 9 through 12, Figure 9 illustrates the tag apparatus 10 in the initial position, just as contact is made with a tree, for example only and not by way of limitation. Figure 10 shows the tag apparatus 10 in the final position wherein the safety probe 18 is fully compressed, and the tag 36 fully rotated and in the "firing" position. Figure 11 shows the tag apparatus 10 in the final position with a nail 54 piercing tag 36. Finally, Figure 12 illustrates tag

apparatus 10 where nail gun 12 is removed from the tree location. It should be noted, as illustrated, that the compliance, flexibility, of tag 36 enables it to flex and easily exit tag magazine 20. That is to say, removing nail gun 12 occurs easily and with little effort due to the flexibility, according to a preferred embodiment, of tags 36. This easy removal is also aided by a large relief angle on the inside edge of the magazine keeper 22 as shown in the illustrations. Again, tag 36 flexes and slips out of the tag magazine 20 as the user pulls the nail gun 12 away from the tree.

By way of further explanation, Figure 13 illustrates tag apparatus 10 in the position near a tree where the tag apparatus begins to convert the translational motion of safety probe 18 as it is pressed against the tree into the rotational movement of lower arm 28. Figure 13 illustrates tag apparatus 10 with a piston 56 and spring 58 , added to the safety nib 82 to gain additional translational travel of the tag 36. Figure 14 illustrates how tags 36 are stored in tag magazine 20 in a "ready" position. It should be noted that the tag 36 ready to be rotated is held in the tag magazine 20 fairly precisely by the magazine keeper 22. If tag 36 is too deep in tag magazine 20, it will not slide out. If tag 36 is too high, lower arm 28 will grab two tags 36 and malfunction. Obviously, a height adjustment device can be added in order to accommodate wear. Alternatively, tag apparatus10 can be designed for very long wear life simply by using hardened surface treatments on high wear areas.

Figures 15 through 18 illustrate tag apparatus 10 after a nail 54 has been driven through tag 36. Figure 15 shows the effect of the translational motion of tag apparatus 10 which causes small arm 48 with a small slot 60 to rotate that in turn rotates small gear 50 which drives large gear 30 and large shaft 32. Ultimately, this moves lower arm 28 which contacts tag 36 in tag

magazine 20 and moves tag 36 into position to receive, be pierced by, a nail 54 from nail gun 12. Figures 16 and 17 provide additional vantage points of the same stage of operation of the invention as set forth in Figure 15. Figure 17 illustrates that the keeper 22 in combination with tag magazine 20 provides a larger opening tolerance 62 at the end of keeper 22 closer to safety probe 18 and a smaller tolerance opening 64 at the rear of keeper 22. As a result, tag 36 is held in place by the combination of keeper 22 and tag magazine 20 toward the rear of keeper 22, as illustrated, after tag 36 is rotated into position. Figure 18 is, again, another view of tag 36 in the final position being held by tag magazine 20 in combination with keeper 22 as discussed above just before nail 54 pierces the tag 36. The tag apparatus 10 automatically indexes as a user presses gun 12 against a tree, for example. Additionally, tag apparatus 10 automatically resets itself as the user pulls the device away from a tree. This is accomplished by energy stored in the spring 58 as well as the energy stored in the nail gun safety probe 18 mechanism. The reset action repositions all components to their original position and orientation with no action required on the part of the user except the gross motion of the nail gun 12 being pulled away from the tree.

Referring now to Figure 19, a view of the tag storage mechanism of tag apparatus 10 is further disclosed. Here again, it is illustrated that keeper 22 may rotate out of position to accommodate the insertion of tags 36. Also illustrated are small constraints on the face of the magazine 20. There are two advance stop pins 66 and 68. Advance stop pins 66 and 68 are in place to ensure proper tag 36 rotation as lower arm 28 indexes a tag 36. During tag 36 rotation to final position, lower arm 28 imposes a force on one end of tag 36. In order to rotate the tag 36 properly, a reaction force must be imposed on the tag 36 at the other end. This is accomplished

with the two small pins, advance stop pins 66 and 68 at the rear of tag magazine 20 that serve as a tag 36 constraint. A third pin, reset stop pin 70 toward the front of tag magazine 20 prevents the tag from moving as the lower arm 28 resets backs to its initial position.

Referring now to Figures 20 and 21, another embodiment of the invention is provided. According to this embodiment, tag apparatus 10 further includes a scanner device 72. Scanner device 72 is held in position upon nail gun 12 by mount 74. Scanner device 72 includes a bar code logger 76, interface 78 and scanning head 80. Scanner device 72 may be any scanner device now known or hereafter developed. Many bar code scanners exist, some that are no larger than a credit card. In general, however, bar code logger 76 stores the bar code information received through interface 78 from scanning head 80. According to this embodiment, a user operates tag apparatus 10 as described above. In this embodiment, however, tags 36 include bar codes, or any desired format for presenting data, representing any desired information and/or data. After tag 36 is attached to a tree, again for example only, a user then scans across the bar code on the tag 36 which is hanging from the tree. This scanning motion takes place in a slight downward cant in the user's hand as indicated by the angle shown on the scanning head 80 in the figures. This angle facilitates reliable sensing without physical interference of the safety probe 18. This is important because the sensor scanning head 80 must come very close to the tag 36 for proper scanning. In addition, this angle prevents undue damage due to contact of the scanning head 80 during nail gun operation as probe 18 is repeatedly pressed against trees. Bar code logger 76 may be removed from tag apparatus 10 when full, or when desired, such that recorded bar code information may be downloaded and manipulated, all as known in the art.

Further, scanner device 72 may include a printer and a Global Positioning System (GPS), as are known in the art, such that information can be applied directly to the tag 36 prior to removal from tag apparatus 10 and reading by scanner device 72. In such a case, the exact location of every tagged tree, and including tree type, for example only, can easily be recorded.

In summary, tag apparatus 10 functions by converting translational motion, in and out motion, into rotational motion, side to side motion, in order to move the tag 36 from a stored position in tag magazine 20 to a final position. Energy for the translational motion is provided by the user pushing the nail gun 12 toward the tree, for example only, in a gross motion fashion. The output rotational motion provides the energy for rotating the tag 36 from the tag magazine 20 to a new orientation where the tag 36 may be affixed to the tree.

The description of the present embodiments of the invention have been presented for purposes of illustration but are not intended to be exhaustive or to limit the invention to the form disclosed. For example, nails may not be the appropriate attachment tool and the tags may be attached by staples, glue or any other means now known or hereafter developed. Thus, the invention may be used to attach "tags" to items other than trees, including shipping labels to boxes, for example only. Many modifications and variations will be apparent to those of ordinary skill in the art. As such, while the present invention has been disclosed in connection with the preferred embodiment thereof, it should be understood that there may be other embodiments which fall within the spirit and scope of the invention as set forth in the following claims